REMARKS

Claims 1-30 all the claims pending in the application. Claims 26-28 stand objected to only as being dependent upon a rejected base claim, and would be allowable if rewritten in independent form to include all the limitations of the base claim and any intervening claims. Claims 26-28 have been rewritten in independent form to place them in condition for immediate allowance.

Claims 4-5, 12-13 and 20-21 stand rejected upon informalities. Claims 1-3, 6-11, 14-19, 22-25 and 29-30 stand rejected on prior art grounds. Applicants respectfully traverse these objections/rejections based on the following discussion.

I. The 35 U.S.C. §112, Second Paragraph, Rejection

Claims 4, 5, 12, 13, 20 and 21 stand rejected under 35 U.S.C. §112, second paragraph. These rejections are traversed as explained below.

Although the Office Action indicates that the "electrical isolation between the base and collectors is not visualized in view of the claimed bipolar transistor since the regions are known to be in physical and electrical contact in basic bipolar transistors," this structural arrangement does not exist with Applicant's invention.

Instead, Applicant teaches that "the invention provides a bipolar transistor comprising an isolation region 20 formed below an upper surface of a semiconductor substrate 10 and a single crystal extrinsic base 30 formed on an upper surface of the isolating region 20. The single crystal extrinsic base 30 comprises a portion (D1) of the semiconductor substrate 10 located between the upper surface of the isolation region 20 and the upper surface of the semiconductor substrate 10." Further, the sub-collector 50 is situated in a portion of the substrate 10 where the extrinsic base 80 is separated and not in contact with the sub-collector 50. Further, "as shown in Figure 1(r) the intrinsic base region 70 is defined by that area underneath the emitter 40 and above the collector 60." (See Page 11, lines 4-11; and Page 14, lines 4-14).

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

II. The Prior Art Rejections

Applicant gratefully acknowledges the Examiner's allowance of claims 26-28, which have been rewritten in independent form.

Claims 1, 3 and 6-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lanzerotti, et al. (U.S. Patent No. 6,441,462), hereinafter referred to as Lanzerotti. Claims 1-3, 6-11, 14-19, 22-25 and 29-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Oda, et al. (U.S. Patent No. 6,521,974), hereinafter referred to as Oda, in view of Lanzerotti. Applicants respectfully traverse these rejections based on the following discussion.

A. The Rejection Based on Lanzerotti, et al.

Regarding claims 1, 3, 6 and 7, Lanzerotti, et al. ("Lanzerotti") fails to disclose, teach or suggest the features of independent claim 1, including a single crystal extrinsic base 80 formed on an upper surface of the isolation region 20. (See Page 3, lines 1-12; Page 9, lines 19-22; Page 14, lines 4-15; and Figures 1(g)-1(r)).

In contrast, Figures 2-5B of Lanzerotti merely disclose a bipolar transistor structure including an "SiGe containing layer 58 includes single-crystal SiGe-containing region 58A abutted by polycrystalline SiGe-containing regions 58B on an isolation region 54." Contrary to the assertion in the Office Action, as indicated above, the SiGe containing layer 58 includes the polycrystalline SiGe-containing regions 58B, and thus is not a single crystal extrinsic base. Indeed, "reference numeral 60 denotes the boundary, i.e., facet region, between single – crystal region 58A and abutting polycrystalline regions 58B. Thus, Lanzerotti does not teach or suggest a single crystal extrinsic base, let alone, a single crystal extrinsic base formed on an upper surface of the isolation region. (See Lanzerotti at Abstract; Column 4, lines 35-55; and Figures 2-5B).

In contrast, as noted above, in Applicant's invention (e.g., as defined in Claim 1), the bipolar transistor includes an isolation region 20 formed below an upper surface of a semiconductor substrate 10 and a single crystal extrinsic base 80 formed on an upper surface of the isolating region 20. In particular, the single crystal extrinsic base 80 is a layered monocrystalline formed from the merger of a LTE SiGE layer 25, which is monocrystalline, and a second monocrystalline layer 30 deposited over the exposed SiGe layer 25, which is shown as region 80. (See Page 9, lines 11-11-22; Page 11, lines 8-16; Page 14, lines 4-20; and Figures 1(e)-1(r)).

For emphasis, Applicant teaches a single crystal extrinsic base, whereas Lanzerotti teaches a base, which is partially polycrystalline.

Consequently, the conventional Lanzerotti structure, as indicated above, discloses a transitional faceted region 60 between a single-crystalline base region 58A and a polycrystalline base region 58B, where "this link region is highly resistive, which adversely impacts device performance." Accordingly, Applicant's invention solves this problem through a single crystal extrinsic base. (See Page 2, lines 1-6).

Thus, Lanzerotti does not disclose, teach or suggest, including a single crystal extrinsic base formed on an upper surface of an isolation region, as recited in independent claim 1, and related dependent claims 3, 6 and 7.

B. The Rejection of Oda, et al. In view of Lanzerotti, et al.

Regarding independent claims 1, 9, and 25, and related dependent claims 2, 3, 6-8, 10, 11, 14-19, 22-24, 29 and 30, first, the references, separately, or in combination, fail to disclose, teach or suggest a reason or motivation for being combined.

Second, even assuming that the references would have been combined, Oda, et ("Oda") does not teach or suggest the features of independent claim 1, and similarly independent claims 9 and 25, including a single crystal extrinsic base formed on an upper surface of an isolation region. (See above).

In contrast, Figures 1-15 of Oda merely disclose a bipolar transistor including an emitter 19, 20, a collector 3, 12 and an intrinsic base 14. Applicant agrees with the Examiner that Oda is deficient and "may have omitted to teach a single crystal extrinsic base region." Indeed, Oda does not disclose or suggest an extrinsic base. However, in Figure 15, element 107 is an "extrinsic based polysilicon," and element 9 of Oda teaches is structurally very similar to element 107. Indeed, Figure 1 discloses "a base leading-out electrode 9 made of high concentration p-type polysilicon." For emphasis, "polycrystalline silicon germanium may also be used for the base leading-out electrode 9." Thus, element 9 is clearly an extrinsic polycrystalline base, and thus Oda does not teach or suggest a single crystal extrinsic base as claimed by Applicant. (See Office Action, Page 3, lines 11-17; Oda, Column 1, lines 20-30; Column 2, line 39-63; Column 7, lines 20-51; Column 8, lines 15-63; and Figures 1-15).

Lanzerotti is also deficient.

Briefly, as discussed above, the conventional Lanzerotti structure discloses a transitional faceted region between a single-crystalline base region 58A and a polycrystalline base region 58B to form the SiGe containing layer 58. Accordingly, "this link region is highly resistive, which adversely impacts device performance." Thus, Lanzerotti also discloses a polycrystalline base, whereas Applicant teaches a single crystal extrinsic base.

Therefore, Applicant traverses the assertion in the Office Action that Lanzerotti "teaches the material for the claimed region in the abstract." Indeed, contrary to the assertion in the Office Action, the base material in the secondary reference, i.e., Lanzerotti, is a polycrystalline structure and does not provide better conductivity than Applicant's single crystal base. Thus, at it is certainly not obvious to one skilled in the art to simply attempt to substitute a polycrystalline base for a single crystal base as the beneficial characteristics of low resistivity of Applicant's invention will be eliminated. (See Office Action, Page 3).

For at least the reasons outlined above, Applicant respectfully submits that neither Oda nor Lanzerotti, alone or in combination, disclose, teach or suggest, including a single crystal extrinsic base formed on an upper surface of an isolation region as recited in independent claim 1, and similarly independent claims 9 and 25, of Applicant's invention.

For the reasons stated above, the claimed invention, and the invention as cited in independent claims 1, 9 and 25, and related dependent claims 2, 3, 6-8, 10, 11, 14-19, 22-24, 29 and 30, is fully patentable over the cited references.

III. Formal Matters and Conclusion

In view of the foregoing, Applicants submit that claims 1-30, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0456.

Respectfully submitted,

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